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NOTE

ON AN

INSPECTION OF CERTAIN FORESTS

IN THE

CENTRAL PROVINCES.

BY

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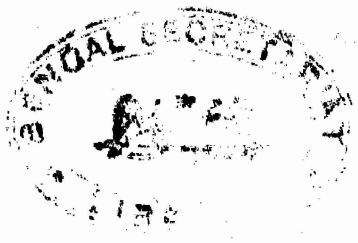
DATED 23RD APRIL 1894.

CALCUTTA:
OFFICE OF THE SUPERINTENDENT OF GOVERNMENT PRINTING, INDIA.
1894.



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NOTE

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INTRODUCTORY.

1. *Journal.*—In anticipation of the orders contained in Government of India No. 134 F., dated 24th January 1894, I left Calcutta on the 16th January and proceeded to Nagpur, and on the 21st idem, having made the necessary preparations for camp, marched with Colonel Doveton, Conservator of the Southern Circle, to Umrer, and inspecting the Chichála Reserve on the 22nd we reached the edge of the Moharli Reserve in the Chánda District on the 23rd. Three days were spent in marching through this reserve and on the 27th we proceeded through the extensive forest tracts of the Wainganga valley to the Ahiri forest, arriving at Allapilli on the 30th. Two days were given up to inspection and the discussion of a suitable Working-Plan for these forests, and we then marched north through the Ghot—Arpilli forests, east of the Wainganga river, and on the 5th February crossed over to Múl. From Mul three long marches through the Gunjawai and Brahmapuri Ranges brought us to Pauni in the Bhandárá District. The 9th of February was spent in inspecting two of the fellings in the Pauni Range, and on the 10th we marched to Mangli and thence to Khoosipar in the Lákni Range, where three Working Circles have been formed and mapped out. On the 12th the fellings at Parkabóri, and the fine high forest of Dudhára were visited, the latter being traversed from Kitári to Soonkond, and we encamped near the railway line at Batera. On the 13th we marched to Chicholi, and inspecting by the way two fellings in the Bawanthari Range we reached Maggerli on the borders of the Nagpur District on the 15th. On the 16th we marched to Deolapar on the Nagpur-Seoni road, and after inspecting the fellings in two of the proposed Working Circles, as well as some coppice 4 and 5 years old, the result of previous fellings, we made an excursion to Korai and Rukur in the Seoni District and visited parts of the old Satpura Reserve, rejoining our camp on the 18th and marching on the 19th to Kunlai on the boundary of the three districts (Nagpur, Seoni and Chhindwara). From Kunlai we proceeded through the Chhindwara District to Thekadhána in the Táwa valley where we met the Conservator of the Northern Circle and the District Forest Officers of Betul and Hoshangabad. Three marches during which the fellings at Dokli and Chordungri were inspected and the Asir tract of forest was traversed brought us on the 1st March to Batori on the edge of the Bori forest. Three days were passed in the Bori forest and on the 4th we encamped at Suplai. Between Suplai and Shahpur on the Itársi-Betul road, the fellings at Gohári and Mokka were visited, and on the 6th we arrived at Kotawári in the Bhowergarh forest. Marching through the Saonligarh forest we reached Lokaltalai in the Nerbudda valley on the 9th and from Seoni-Málwa

on the 11th I proceeded by rail to Nagpur, where on the 13th I had an interview with the Chief Commissioner. This closed my tour.

2. *Indebtedness to Officers for information supplied.*—For the information obtained and recorded in this note I am indebted to both Conservators and their Officers, but more especially to Colonel Doveton, Conservator of the Southern Circle, whom the Chief Commissioner kindly permitted to accompany me throughout my journey.

The Classification of the Reserves with a view to Disafforestation of the Cultivable Portions.

3. *Government orders on the subject.*—The latest orders on the subject are those contained in the Chief Commissioner's No. 442, dated 26th January 1893, to the address of the Secretary to the Government of India, Revenue and Agricultural Department, and they were duly approved by the Supreme Government. These orders seemed to contemplate:—

(i) The disafforestation of cultivated areas, and such cultivable areas as can at once be formed into villages;

(ii) The selections of other areas which may eventually be taken up for cultivation, and also disafforested in due course.

4. *Manner of Classification.*—The reserves at present stand classified as A and B Reserves, but no distinct line of separation has been drawn between the two classes. It is true that certain of the A forests, such as Ahiri and Moharli in the Chánda District, Bori in Hoshangabad and some of the sâl forests of Mandla, have been strictly protected and no cultivation has been allowed in them: but equally some of the B forests have been similarly treated, while some A Reserves and the majority of the B Reserves have been open to cultivation.

The aim now is to place all reserves, designated A Reserves, under strict conservancy and the entire control of the Forest Department, while the remainder will be open for the settlement and extension of cultivation.

Pending the final marking off of these two classes, a considerable area remains in the intermediary stage, awaiting the determination whether it shall be classed as A, or be available for cultivation. This is now known as B, while the areas which it has been decided are more suitable for cultivation than for reserves, are now styled B^1. When the entire area called B has been dealt with there will be two classes, A and B^1.

5. *Progress made and recorded.*—So far the progress made in this classification, as ascertained from the records, has not been rapid.

The reserves in Form 46 of the last Annual Report follow the classification A, B and B^1, but in the Government Resolution on that and the report for the previous year, B^1 denotes the area open to cultivation, but B^2 is made to represent the area still to be allotted to class A, or to class B^1.

The classification is complete in the following districts:—

		A.	B^1.
		Sq. miles.	Sq. miles.
Southern Circle.	Bálághát	730	285
	Bilaspur	648	*Nil.*
	Nágpur	519	*Nil.*
Northern Circle.	Wardha	200	*Nil.*
	Nimár	1,338	471

and in others considerable progress has, in one way or other, been made. In Bhandárá the proposals will be to transfer the whole to A. The only progress reported in Chánda is the classification of 39 square miles under B^1, and other proposals are with the Settlement Department. In Chhindwára, which district is under settlement, the matter is being dealt with by the Settlement and Forest Officers, who, it is expected, will be able to propose for disafforestation, without preliminary classification, such cultivated or cultivable areas of limited extent as are found in this District.

The portions of the Raipur District remaining to be classified are the Sihawá forest and about 100 square miles south of the Sambalpur road. Nothing has yet been done in the Sambalpur District, but it is probable the reserves in their entirety are suitable for maintenance as such. The classification is said to have advanced in other districts, but the latest forms available, 1892-93, show the following:—

			B^1.	B.
Southern Circle—Seoni District			9	93
Northern Circle.	Mandla	„	171	1,771
	Jubbalpur	„	...	350
	Damoh	„	...	817
	Saugor	„	1	687
	Narsingpur	„	...	63
	Hoshangabad	„	...	1,170
	Betul	„	...	621
			181	5,572

In Chárwá (Hoshangabád District) 479 square miles have been completely dealt with, and all but about 90 square miles which have been added to the A class of reserves, have not only been transferred to B^1 class as available for cultivation, but have been allotted to cultivators. This area of 389 square miles may perhaps now be disafforested. The remainder of the Hoshangabad District was disposed of in Proceedings C. C., No. 3140, dated 1st September 1892, from which it would appear that 432 square miles should have been transferred to B^1 and 349 to A. The classification would then be for the total 1,807 square miles, A, 1,076 and B^1, 731 square miles, and these are apparently the figures which should have been shown in Form 46 of the last Annual Report. It is understood that material has been collected for classification in the remaining districts and will be shortly submitted.

6. *Suggestions as to Classification.*—The proper course in giving effect to this classification has not perhaps been always completely followed. The Department should in drawing up proposals for classification give lists of, and locate, all cultivation by means of maps showing, as nearly as may be, the sites of the fields; and it should report whether it proposes to include the tract in A or B^1, class by its classification and justify its proposals, if for inclusion in A, by the reasons, which may be the want of permanency of the cultivation, the smallness of the cultivable area, or other.

7. *Management of the two Classes.*—If it is decided to classify an area as A, the villages and cultivation included, if not demarcated out as separate plots, should be treated as forest villages. The B^1 areas should, in accordance with the Chief Commissioner's orders, remain without change under forest management until the formation of village blocks and their settlement. It would seem that this latter procedure has not been always enforced, from the

remarks in the introduction and in paragraphs 5 and 33 of the Report of the Conservator, Northern Circle, for the past year. I venture to think it is of importance that all reserved areas, whether classed in B^1 or not, should, as ordered by Sir A. P. Macdonnell, remain under the management of the Forest Department until prepared by the Settlement Department for disafforestation. Up to the time of settlement and disafforestation there seems to be no reason why the Settlement Department should realize grazing-fees or sell timber off areas available for cultivation. Such a system will only lead to the people having to pay double grazing fees, as animals graze during the year over wide areas, and in other respects will result in a dual management over the same, or not clearly separated, areas and thus cause confusion.

8. *The Classification of Reserves as Fuel and Fodder Reserves.*—The classification of the reserves as fuel and fodder reserves, as reported from the Northern Circle, would seem to be misleading, since the whole forest area constitutes fuel and fodder reserves *par excellence*. In those reserves open to grazing the fodder is eaten annually, while in those closed, grass is available for cutting in all years, and can be used as pasture on an emergency. Both the open and closed areas, whatever their treatment, produce fuel in quantity.

9. *Other Classifications by Forest types.*—The further classification into forest types, beyond what has been entered by the Survey Department on the new maps, also appears to be purposeless. The description of the Working Circles as they are formed, either by circles, by blocks, or by compartments, according to the detail found requisite, will find its proper place in Working-Plans reports and be there permanently recorded.

Working-Plans.

10. *No Working-Plans and the urgency for framing them.*—Up to date no regular Working-Plan has been sanctioned in either Circle. The urgency of the Working-Plans rests on the scheme of the late Chief Commissioner, Sir A. P. Macdonnell, who is understood to have had in view the two main objects—

I.—To make timber and forest produce readily available to the people and to agriculturists in particular, in replacement of the system, which has hitherto been in vogue, of admitting consumers on licenses to cut and remove timber and produce much as they pleased.

II.—To bring the exploitation of the forests under systematic control, in view of proper sylvicultural treatment, efficient protection from fire and a regulation of grazing.

11. *Preliminary work done.*—So far in order to attain these objects considerable work has been done.

In the Northern Circle.

A programme* has been submitted and approved by the Local Government under which it is proposed to form no less than 248 Working Circles in the Northern Circle, varying in number for the different Districts from 9 in Narsingpur to 111 in Mandla.

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* It has no resemblance to a Working-Plan, provisional or other.

In the Betul Division cuttings and valuation-surveys over 5-acre plots and in two instances over 10 acres were made in 4 of the 6 Ranges. The average yield was something over 9 tons to the acre.

In the Hoshangabad Division a total of 516 acres was cut over and the produce measured up, the average was in poles and fuel 4·4 tons per acre.

Similar fellings and surveys were made in all other Divisions and the total result was an outturn of 19,000 tons from 3,355 acres or 6 tons per acre on an average, and not 9 as stated in paragraph 15 of the introduction to the Annual Report for 1892-93.

Appendices A and B of the same Annual Report give identical figures and both are misleading, in that they have as yet no basis of facts.

The work of compiling Working-Plans from the available data has so far proceeded that suitable plans have been drafted for—

A.—The Beria forest of the Khandwa Range of the Nimar District of 6,080 acres by Mr. T. C. Howell, Ranger.

B.—The Garah Kota forest of the Saugor District of 2,899 acres by Mr. G. F. Taylor, Deputy Conservator of Forests.

These are practically ready for submission under the provisions of the Code.

The 18 attempted Working-Plan Reports (paragraph 12, Annual Report, 1892-93) have all been sent back for alteration or revision by the Conservator.

A Report and Plan for the Sukri forests of the Jubbulpur Division of 4,814 by a Ranger are not such as can be passed and four Working-Plans, with maps, for four small proposed Working Circles (300 and 600 acres) in the Bhowargarh Range of the Betul Division, carefully compiled by Mr. Milward, Assistant Conservator, though complete in themselves, are probably unsuitable owing to the smallness of the areas, and the absence of demand.

In the Southern Circle.

No programme has been drawn up or submitted. A Working-Plan has been made (and the Report has only to be fair copied for Press) for the East Pench Range in the Nagpur District comprising 155 square miles. It is divided into four Working Circles, each to be worked on a 30-year rotation, and fellings were made last year in the Chorbawli Circle and this year in all four circles.

Similar Working Circles are being laid out in the Umrer and Katol and Nagpur tehsils, but the blank areas or those on poor soils and steep hills have to be separated from the workable areas.

In the Bálághát Division the hills have to be separated and excluded from the part suitable for coppice with standards or improvement fellings.

In the Bhandárá District a similar plan has been drawn up for three Working Circles in the Lákni Range. The annual fellings, with an average area of 400 acres each, have been marked off on a map, and the completion of the Report is a small matter.

In the Pauni Range only a few preliminary compartments have been marked off in four different localities, with a view to the division of all the forests of this range into four Working Circles of about 10 square miles each giving annual fellings of 200 acres.

Five fellings have been opened out in the Báwanthari Range and six in the Pertábgarh Range.

Tentative fellings have beenm ade in 14 localities in the Biláspur District as well as in Raipur, Chánda and Sambalpur in order to give speedy effect to the orders of 5th January 1893.

SUGGESTIONS NOW MADE FOR THE PREPARATION OF WORKING-PLANS.

12. *Reasons why regulated fellings cannot be introduced generally.*—To give effect to the policy of the Local Administration, as initiated by the late Chief Commissioner, it is in the first place of the greatest importance that the fellings should be reasonably near to villages, but it will be readily admitted that there is a limit to the number of the fellings, and to the size, below which it is impossible to reduce them with due regard to the available establishment and in view to proper supervision, effective fire protection and closing to grazing. For instance, it cannot be desirable to fell annually for the supply of one or two forest villages such as Dokli, the requirements of which are met by commutation in dry wood, with the result that not a stick is saleable, whether 1 acre or more is cut.

In the same way it is questionable whether in such tracts as the Ghot —Arpilli Range, where the total demand is represented by R173 for timber +R192 for fuel and charcoal = R365 received in commutation fees, fellings can advantageously be made. The tract is extensive, though the forest is inferior and the few villages are scattered at long distances apart. In these circumstances change is scarcely called for, since the demand on the forest is the merest fraction of the production. Wairagarh and Sironcha also Ranges of the Chánda Division are very similarly situated.

In the whole of the Chhindwára District with a total of 707 square miles of State forest the yearly demand upon them is only 4,000 tons of fuel and 1,000 tons of poles. It will be clear that 1,000 acres cut over a year would yield all requirements, and that having due regard to the size of the fellings their number must be limited. It may be found possible to arrange for fellings in parts only, where the demand is greatest, and to meet requirements in more remote parts by the unregulated fellings under licenses hitherto in force. The foregoing examples go to show that no hard-and-fast rule can be laid down for the working of the forests to meet local and agricultural requirements and that commutation for these wants may still be a suitable arrangement, for the people in some localities, while the admission of licensees under certain restrictions may be more or less a necessity in other parts, where the demand is insufficient to consume the produce of fellings over areas of convenient size.

13. *Consideration of the demand and where it can be met by coppice fellings.*—The first consideration must be the demand which, however roughly, must be to some extent gauged. And to this end the tentative fellings, more particularly the numerous ones made in the Northern Circle, will be useful; for it is obviously no use continuing them where there is little or no demand; and further indications will probably lead to the working of the forests more in view of the demand which centres on main roads and from which produce is easily distributed.

The demand may be for local purposes, or to meet more distant markets such as Nagpur or those supplied by means of the Railway lines or the Godáveri river. The sources of supply may be the same or different, but so long as a demand exists it is the duty of the Forest Department to meet that demand up to the possibility of the forest. Where the demand is local and

for the agriculturist, and the forests carry a crop of varying density, from open to complete, of poles and small timber standing on high stools, often badly shaped and hide bound with spreading old mohwa and other trees such as are found in the plains portions of Bhandára and Nágpur, it can be accepted that a cutting over, sparingly in the open and more heavily in the more complete parts, will meet requirements, and provided the areas felled over are *strictly* protected from fire, and closed for ten years against grazing, be beneficial to the forest growth. The treatment will be coppice with standards in the denser and a mere improvement felling (*viz.*, the cutting back sparingly of the worst stems) in the more open parts. The rotation of 30 years already proposed may be accepted.

The areas to be so treated may vary within wide limits, but broadly speaking it will be found convenient to have them of not less than 5 or more than 30 square miles; these would give felling areas of 107 and 640 acres, respectively.

Such is the Working-Plan drawn up for the East Pench forests of the Nagpur District with a total estimated area of 155 square miles, and divided into four Working Circles; and similar plans are being made for the forests of the different ranges of the Bhandára District. That for the Pauni Range embraces 40 square miles of forest lying within a compact area; it is proposed to have four Working Circles, and I am confident that the four fellings over areas, which may extend to 200 acres each on an average, will meet requirements both as to quantity and quality of produce as well as in the matter of easy accessibility. I recommend the arrangements which will be the outcome of the Working-Plans now being framed for the East Pench, Lákni, and Pauni Ranges to the Chief Commissioner for general adoption in this class of forests.

14. *Choice of areas to be coppiced.*—Complete blocks or groups of forests may be treated, or these with the exclusion of:—

1. Areas where bamboos predominate, and where a cutting out of the tree growth with the reservation of standards would result in the gradual establishment of a bamboo forest pure and simple (this result is seen whenever shifting cultivation is practised in this class of forest).
2. Areas where from the want of soil, or the unsuitability of the soil, the forest is only open grass land with scattered tree vegetation in isolated trees or bushes or in groups. (Such areas can be more profitably kept open to grazing).
3. Areas where from the rocky and steep or precipitous character of the hills, the soil is almost unproductive, and to remove the present protective covering of such growth, as has been able to establish itself during a term of successful fire protective measures, would be to undo the work of years and reduce the area to the condition of sterility from which it has within recent years made some improvement. The areas of this class, which can be turned to no better purpose, can only be rendered productive of forest produce at all by protection over a long series of years, during which the forests may be expected to reconstitute themselves with more or less completeness. Under the favouring influence of more complete growth the production will be gradually increased and tracts, which were valueless 30 years ago and have now no

appreciable value, will come to be a source of supply of useful produce and to have a value.

4. Areas which in view of their meeting special demands in more valuable material such as teak wood, cart axles, mine props, etc., require a different treatment.

15. *Forests where improvement fellings should be preferred.*—In other parts, the objects of the administration will, in my opinion, be met by "Improvement fellings," or by an operation which will differ from the one in the coppice with standard areas only in intensity. That is, instead of removing the greater part of the existing crop, say 6 tons or more, and reserving 20 or 30 standards to the acre, the fellings will be spread over larger areas and the greater part of the existing crop will be reserved and some 2 or 3 tons to the acre only cut out. Such a treatment is desirable in the Saonligarh and Bhowargarh forests and probably over all the hilly tracts of the Betul and Hoshangabad Districts. Such operations have been carried out in past years, but only teak was cut during the years 1871—83 in the Saonligarh Reserve, and in the old Satpura Reserve above Korai.

16. *Agency for the preparation of Working-Plans.*—It has been suggested that Working-Plans and Reports can be compiled by Rangers and Extra-Assistant Conservators. This is very doubtful, and a better system will be to make the Divisional Officer responsible for the preparation of the plans, affording him such assistance by means of a junior officer as may be necessary either in the collection of detail or preparation of maps. This can be done in Bhandára, Chhindwára, Seoni and other Districts, while in the more important charges such as Nagpur, Chanda and Hoshangabad special Working-Plans officers may be required to take up work independently in certain Ranges.

17. *Detailed recommendations for the preparation of Working-Plans.*—More detailed recommendations for the preparation of Working-Plans for the different forests visited have been added as an Appendix.

Communications and Buildings.

18. *Possible tramways.*—A great want in the Central Provinces is roads or other means of export.

Hitherto but little has been expended on roads, and although it is quite true that in the dry season carts can go anywhere in some districts, much can be done to make produce easily and cheaply available to the people by laying out well-considered systems of roads. In a few instances it may be possible to justify the laying of tram lines, and it will be well to consider these first.

The yearly consumption of Kamptee and Nagpur in timber and fuel is found from octroi returns to be—

	Tons.
Kamptee	10,000
Nagpur	40,000
	50,000

The selling rate of this at 4 annas a maund represents R3,50,000. There is no reason why the greater part of this supply should not be met from the East Pench forests at a cheaper rate than at present. It is calculated that cartage costs 2 annas and 4 pies a ton a mile, while by tram line a ton can

be carried for 1 anna a mile. With 25 miles of tram line, costing R2,50,000, there would be a saving of R1-9-0 on as many tons as could be disposed of from the East Pench forests. It is believed that the supplies from *malguzari* forests are falling off, and this is borne out by the rise of price of fuel in Nagpur within the past three or four years from 5½ maunds to 4 maunds to the rupee.

Other tram lines, which it may be possible to make out a case for, are two lengths of 7 miles in the Ahiri forests, the one to join the mills with the *ghât* on the Pranhita river, the other connecting the southern forests with the mills.

19. *Roads.*—In the matter of roads, those existing in Bhowargarh and Saonligarh should be regularly repaired and a complete system laid out.

The improvement of communications in view to the utilization of the fine bamboos in Bori should be carefully studied.

Roads should be made north and south from the Bhandára-Lákni road, connecting it with both the Parkabori and Matori Working Circles.

Compartment lines should everywhere be made passable, and inspection paths should be kept up along all boundary and fire lines as is done with so many and great advantages in the North-West Provinces.

20. *Buildings.*—Rest-houses for officers and subordinates are also much needed to facilitate supervision and bring about effective management.

Rates.

21. *Inadvisability of selling produce at different rates.*—An attempt has been made to sell produce at a higher rate to traders than to agriculturists, but it is doubtful if a differentiation of rates can be applied in practice. To give a simple instance, a *tinnas* pole has a market value anywhere in the Central Provinces of 8 annas, and if agriculturists can obtain it on payment of 2 annas, and incur no penalty if detected trading with it, there is but small prospect of direct sales by the Department to traders at the higher rate.

General Remarks.

22. *General appearance and future prospects of the forests.*—When it is remembered that the forests in the Central Provinces consist in a large measure of old Dhya cultivation protected and allowed to spring up within the past 30 years, the vigorous growth of many species and the completeness of the stock, considering the climatic conditions of Central India, are strikingly remarkable. As instances the fine teak of 1′ 6″ and 2′ 0″ in girth and 80 feet in height in Bori, Ahiri, Dudhára, on the Táwa and in parts of Bhowargarh and Saonligarh may be noted, where as far as can be seen they promise as well as teak of similar age in many of the drier forests of Burma. Moreover, the vigorous natural reproduction of this species has introduced it, where 20 years ago there was question of resorting to artificial means. The dense thickets that have sprung up of *Terminalia*, *Pterocarpus*, *Diospyros*, *Ougeinia*, *Lagerstroemia*, etc., wherever the beneficial influence of an old mohwa tree was felt, are the best proofs of the completeness which may be obtained once the soil is protected, and the conditions favourable to young growth are established.

The preponderance of *Lebidieropsis* in the forests below ghâts and of *Ougeinia* further north marks these species out as peculiarly adapted for com-

pleting the canopy, while the valuable *Chloroxylon* spreads over the most sterile soils and with *Soymida* gradually covers the most hopeless looking of blanks.

There can be but little doubt now, whatever may have been thought 30 years ago, but that the considerable forest tracts, existing for the most part on soils which can be turned to no other purpose, will on coming to maturity, 50 to 100 years hence, yield a wealth of material not only for local consumption, the development of iron or other industries, but also for export to Bombay and elsewhere.

APPENDIX.

DETAILED SUGGESTIONS ON THE PREPARATION OF WORKING-PLANS FOR CERTAIN FORESTS IN THE CENTRAL PROVINCES.

TRACTS TO BE TREATED BY THE METHOD KNOWN AS "COPPICE WITH STANDARDS."

Nagpur Division.—Colonel Doveton has already made suitable arrangements in this and the Bhandárá Division. The Working-Plan for the East Pench Range has already been referred to as suitable. A similar plan providing for three Working Circles in the West Pench Range is under preparation. Some grass *birs* excepted, the tracts in the Nagpur and Katol tehsils which should form two Ranges may be worked in six Working Circles.

In the Umrer Range there may be three or more Working Circles. The main consideration should be the excluding from any felling scheme of the *birs*, which have their value as grass lands and carry only dhak with a few other species either as isolated trees or in small clumps. For instance, in the Chichala Reserve only the cresent-shaped well-wooded area on the south and west should be cut over at present. The chief value of the remainder is the pasture which it affords. The trees and groups of trees are desirable in many ways, and nothing would be gained by cutting them back.

In this way produce will be made available on 16 or 17 different points, and while the fellings can be properly supervised the areas cut over will be capable of efficient protection.

Bhandárá Division.—The forests of the Bhandárá Division are for the most part capable of similar treatment. The Conservator in my opinion rightly proposes four Working Circles in the Pauni Range, the hilly ground with steep slopes and unproductive soil, as well as some areas where bamboos are plentiful, being excluded.

Four Working Circles have been formed in the Lákni Range with average 'coupes' of 400 acres. Five have been mapped out in the Báwanthari Range with somewhat larger 'coupes' and six are proposed in the Pertábgarh Range.

A portion only of the Gaikhuri Range is suited for similar treatment, an area of some 90 or 100 square miles including the Dudhara Reserve being treated as high forest, and either completely protected for a considerable number of years or subjected to carefully executed improvement fellings.

Chhindwára Division.—The yearly demand in each of the five Ranges may be estimated as varying from 500 to 1,200 tons, and this is not evenly distributed. The majority of the forests are on rocky hills, the best wooded portions covering the slopes dipping to the Kanhan and Pench with their feeders. These, except on the Silewani side, where the wood is dragged, are generally unworkable for want of roads. In these circumstances it does not at present seem practicable to establish well-distributed fellings over the division, and the best arrangement would seem to be to make experimental feelings in localities where the demand is greatest, for instance, near the Nagpur road, in the south of the Ambara Range and in the north of the Amerwara Range, closing the forests in the neighbourhood to permits, but continuing the permit system in the more distant parts where the demand is small. The division is backward and undeveloped, affording an annual revenue of some R8,000 only from wood inclusive of firewood and charcoal.

Seoni Division.—From information afforded by the Deputy Conservator, all that has been done is to concentrate license holders on certain localities, whence certain standards being reserved, they cut and extract according to their requirements. There is no guarantee that definite areas will be worked out, or that the inferior material which it is desirable to cut will be felled. Probably, excluding the old Satpura Reserve which demands special treatment, coppice Working Circles can be arranged for.

Chánda Division.—In the Wairagarh, Ghot and Sironcha Ranges, where the people obtain their requirements under the commutation system, the following will show how light is the demand on the forests :—

II.—Revenue for 1892-93.

	Wairagarh.	Ghot.	Sironcha.
Forest area in square miles.	276	604	882
	R	R	R
Timber	29	173	196
Firewood and charcoal	265	192	126
Bamboos	23	3	102
Grazing and fodder grass	5,387	3,002	4,610
Other produce	775	697	927
Unallotted *	8,072	2,850	2,356

* This represents value of stamps sold.

It is doubtful if the time has yet come to introduce systematic fellings in these extensive areas.

The forests of the Warora Range consist of 162 square miles of reserves and a certain area of unclassed forest. They comprise, from information furnished by Mr. Lowrie, a fairly compact stretch of 20 square miles known as the Salori forest, from which there is a considerable demand for charcoal. The chief species are *Acacias Catechu and Leucophlœa, Terminalia and Ziziphus.* Fires do not occur. The area has been divided into six compartments, one of which it is proposed to keep as a grazing-ground. The remaining compartments may well be worked over and coppiced with standards in 40 years, each compartment supplying eight successive 'coupes.' Farther north is a group of detached areas, known as the Lonara forests, situated on black-cotton soil. These areas carry a poor growth of *Butea, Terminalia* and thorny species, and are most useful as grass reserves and grazing-grounds. The patches of better growth serve as shade and as a nucleus of more extended forest growth. Grass and dry wood will continue to be extracted and no fellings should take place.

A third group of forests runs north from the Moharli Reserve to the junction of the Warda and Nagpur Districts and is situated on the high land at the sources of the Erai and Mul rivers. Hitherto, owing to higher rates being charged in the Warora Range, the chief demand has been on the Moharli Reserve. Areas may be selected for coppice Working Circles in these forests.

Excluding 35 miles to be given up for cultivation, the Haveli Range contains nearly 300 square miles of forest land, the main demand from which lies on the west in the direction of Chánda, where the Janona block of 45,495 acres is successfully fire protected. Parts of this area, excluding the bamboo-producing tracts, may be treated as coppice, and there seems no reason why license holders should not continue to be admitted to the B1 areas, pending their being taken up and settled.

In the Dhábá Range it is questionable whether the demand is sufficient to justify the coppicing of areas. The revenue from timber (R970 in 1892-93) is principally derived from Dhaura cart axles, and their extraction might be regulated by opening blocks in rotation; the demand for firewood and charcoal, representing a money value of R500 a year, can probably be met from dry and windfall wood, while the remaining requirements could continue to be provided for by permits.

In the Ganjawai and Bhamapuri Ranges, where the forests have been heavily worked for charcoal for smelting iron ore, and tentative fellings only have been made, there is a necessity for Working-Plans, and the treatment of the forests on the lines which have been followed in the Bhandára District is advisable.

FORESTS FOR WHICH IMPROVEMENTS FELLINGS (PARAGRAPH 16) SHOULD BE PREFERRED.

Betul and Hoshangabad Divisions.—For the forests of these divisions, situated for the most part in hilly country on interior soil, I am of opinion that the treatment by coppice cuttings is unsuited, and that it would be preferable to practise improvement fellings extending operations over larger areas, and returning where necessary to the same area after a shorter interval than 30 years. As examples: the Chordungri Forest, returned as 13,000 acres, is an isolated block, bounded on the north by the Táwa river and on the west by its tributary the Phopas. It covers a rocky outcrop of hills with the highest point Lodadeo 2,138 feet. The whole is hilly and the main ridge, with precipitous sides, is formed of masses of quartzite and flints. It is extremely dry, and almost soilless. The growth is stunted and the crop of *Terminalia, Boswellia,* Teak, *Buchanania,* and other trees for the most part open. Instead of treating one or two 300-acre portions as coppice, it would be preferable to work over the entire area with improvement fellings. The eastern and western parts might be treated separately in the interests of the demand, and gone over systematically in 10, 15 or 20 years, as may be found practicable, in view of the peoples' requirements and the proper carrying out of the fellings

In the Bhowargarh and Saonligarh forests similarly, instead of treating parts of 300 or 600 acres as coppice, larger Working Circles might well be formed and subjected to improvement fellings.

The same remarks apply to the forests of the Hoshangabad Division.

It may be urged in favour of the coppice that it has been applied in the Bombay Presidency to forests on hilly ground, but it must be borne in mind that the rainfall and conditions of growth are much more favourable there than in the Central Provinces.

AHIRI FOREST.

These forests from their richness in Teak, Saj (*Terminalia tomentosa*), Shisham (*Dalbergia latifolia*), Bijasal (*Pterocarpus Marsupium*), Haldu (*Adina cordifolia*) and other trees

all capable of attaining to fine dimensions, and from the total absence of any local demand, require special treatment as high forest. At present the portions for which it seems desirable to prepare a Working Plan are the entire Bhimaram and Mirkalu Blocks, known as the old reserves, and with them the outer belts and enclosed new area lying between them. In other words, a plan should deal with the whole of the forests lying south of the Munger Nálá.

The area north of the Munger Nálá will go to supply markets farther north, the outlet to which depends on the opening out of new main lines of roads towards Bhandára and Nagpur. Until these roads are made this portion of the forests need not be considered. The teak-producing tracts within it are less extensive than those in the south. It has been more recently acquired and protected, and consequently natural reproduction is less advanced, and the stock less complete than in the previously reserved areas. South of the Munger Nálá the area comprises some 70 square miles, out of a total of 127 square miles, and the chief saleable products are teak and bamboos which find a market down the Godáveri river. Formerly a considerable quantity of Saj was disposed of as sleepers for the Chattisgarh Railway line.

The condition of the forest is that of a mixed forest producing a heavy proportion of teak, from which all the I and II and even many of the III class trees of value were removed in the years preceding 1870* or destroyed by Dhya cultivation. Since then (in the years 1872—76) 2,432 trees were felled, and subsequently the following statement represents the outturn:—

* See stumps counted in 1876. Sir D. Brandis' description, paragraph 13.

Statement showing the number of green trees cut from the Bhimaram and Mirkalu Blocks, Ahiri Range, from 1878-79 to 1893-94.

Year of cutting.	Bhimaram Block.				Mirkalu Block.				Total green trees cut.		Total outturn in c. ft.		Remarks.
	Green trees cut.		Outturn in c. ft.		Green trees cut.		Outturn in c. ft.						
	Teak.	Saj.	Teak.	Saj.	Teak.	Saj.	Teak.	Saj	Teak.	Saj.	Teak.	Saj.	
1878-79	...	536	...	20,100*	...	...	...	...	...	536	...	20,100	
1879-80	...	7,813	...	358,490	...	...	...	...	...	7,813	...	358,490	
1880-81	...	281	...	10,040*	...	...	...	...	...	281	...	10,040*	
1881-82	9	400	375*	15,000*	...	...	...	...	9	400	375*	15,000*	
1882-83	...	9	...	200*	99	...	3,100	...	99	9	3,100*	200*	
1883-84	919	174	77,700*	6,500*	...	...	...	...	919	174	77,700*	6,500*	* Estimated outturn.
1884-85	...	...	...	...	...	...	...	...	...	...	...	...	
1885-86	...	...	...	...	...	...	...	...	...	...	...	...	
1886-87	...	...	...	...	...	...	...	...	...	...	...	...	
1887-88	2,428	...	75,870*	...	...	...	...	...	2,428	...	75,870*	...	
1888-89	58	...	1,812*	...	...	...	...	...	58	...	1,812*	...	
1889-90	200	...	14,350*	...	...	...	...	...	200	...	14,350	...	
1890-91	99	...	2,475*	...	...	...	...	...	99	...	2,475	...	
1891-92	161	...	6,000	...	...	...	...	...	161	...	6,000	...	
1892-93	500	...	48,720	...	...	...	...	...	500	...	48,720	...	
1893-94	253	...	31,270	...	149	...	10,150	...	402	...	31,420	...	
Total	4,627	9,273	248,572	410,390	248	...	13,250	...	4,875	9,253	261,822	410,390	
									In tons		5,236	8,208	

The forest has become much more complete, under the influence of protection, and a remarkable change is the spread of *Barleria cristata*, brought to notice by Mr. Lowrie, which takes the place of grass as the cover becomes complete. From an inspection of the Bhimarám Block it is evident that but few sound teak trees remain of either the I, II, or III classes, and that it is only in parts that the IV class (1′ 6″ to 3′ 0″ in girth) with good promising stems is well represented.

Linear valuation-surveys made in 1893 over 89 acres of the old compartments 1—7, comprised in Division III of the Bhimarám Block of 954 acres, give the following trees per acre :—

Trees.	3" to 6"	6" to 12"	12" to 18"	18" to 24"	Over 24
Teak, good	20·39	1·70	·31	·19	·07
„ bad	13·46	3·04	1·65	1·41	·80
Saj	8·07	3·66	2·42	1·99	·91
Shisham	1·17	1·39	·93	·32	·06
Bijasal	·15	·16	·14	·02	·01
Haldu	·07	·04	·03	·06	·13
Other	51·92	36·31	9·87	2·93	·65

Taking into consideration teak only of the various classes, these surveys and similar ones made in May 1893, over 21,887 acres in old compartments 1, 2 and 3 of Division C of Mirkalu give the following results per 100 acres :—

		Surveys of 1893.				Mr. Thompson's Surveys of 1876.
		Bhimaram.		Mirkalu.		
I.—Class	Sound	7	...	54	...	241
	Unsound	...	80	...	110	
II.—Class	Sound	19	...	100	...	172
	Unsound	...	141	...	200	
III.—Class	Sound	31	...	210	...	315
	Unsound	...	165	...	310	
IV.—Class	Sound	170	...	210	...	609
	Unsound	...	304	...	470	
Total	Sound	227	...	574	...	...
	Unsound	...	690	...	1,090	...
		917		1,664		1,337

No recent surveys have been made in the northern and plains portion of the Bhimarám Block, but the valuations made by Mr. Thompson in 1876 were considered reliable and the results are entered above. The trees are not classified as sound or unsound, but there is evidence that parts are richer than those counted in Bhimarám in 1893, and this is borne out by eye estimate. Supposing ⅔rds, or 30,000 acres, of the 70 square miles to be teak-producing and assuming for the sake of illustration the above valuation-surveys to be fairly representative of the growing stock, the entire area would contain :—

I.—Class	Sound	8,000	...
	Unsound	...	41,000
II.—Class	Sound	14,800	...
	Unsound	...	49,000
III.—Class	Sound	30,000	...
	Unsound	...	73,000
IV.—Class	Sound	69,000	...
	Unsound	...	107,000
Total	Sound	121,800	...
	Unsound	...	270,000

This gives in the roughest way an idea of the present stock of teak with a crop of well-distributed young growth, as full as can be wished for in a mixed forest, of which teak is and

should only be the predominant species. The regeneration has been all that Sir D. Brandis anticipated in 1877; only young teak, instead of being suppressed and killed out by Saj, Bijasal and masses of young growth of other kinds, have sufficiently held their own and are now seen over-topping other species by which they have been drawn up or through which they have gradually forced their way. The teak saplings are not in all cases healthy and there are patches where they seem to be dying out. These are where they have come up pure, and their establishment and more vigorous growth will probably here depend on other species introducing themselves and improving the soil conditions.

The Working-Plan for this Forest should in my opinion be drawn up as follows:—

The first step should be, with the aid of the new 4 inches=1 mile map, to divide the area into suitable compartments. The old compartments made for enumeration were not suitable for other purposes and their limits have disappeared. The compartments, now to be marked off and maintained, should, as far as possible, be bounded by roads existing or proposed, fire lines and natural features. Such boundaries, where insufficient, may be supplemented by compartment lines 12 feet in width, along all of which inspection paths should be opened up and maintained. The compartments should probably not be less than 500 acres or more than 1,000 acres each. In this way some 60 compartments may be formed, 40 of which would possibly be taken up for working, and 20 consisting of inferior forest or wholly of young growth would be set aside. The stock of I, II, III and IV class teak sound and unsound as well as I and II class Saj, Blackwood and Haldu should be estimated separately for each compartment in one of two ways—

(1) either by linear surveys 2 chains wide run in suitable directions;
(2) or by selecting well-defined plots, the areas of which can be taken off the map readily, and by completely enumerating these.

The lines (1) need not be laid out on the ground. A centre line must be accurately chained and check measurements made to either side as often as may be necessary. In this way with a trained staff of enumerators and recorders the lines can be run very rapidly. This system is preferable to (2) which need only be resorted to in broken ground. The percentage of area to be counted out need in no case be more than 10 per cent., and if lines and plots are intelligently chosen 5 or 6 per cent. will give sufficiently approximate results. From ring countings on stumps and by measurements taken with Pressler's growth gauge, the period (30 or 40 years) required for a II class tree to become I class may be ascertained. Then taking the I class sound trees, their removal may be spread over that period, and the removal of all unsound I and II class trees arranged for at the same time. The plan should, however, be based on area, for instance, if about 40 compartments are laid out, it will be convenient to work over one a year, and on the estimates of sound I class and unsound I and II class together to so group the compartments that in periods of four or five years the proper fraction of I class sound trees will be available. The outturn of unsound trees may be varying from year to year.

Supplementary provisions may be made :—

(*a*) To admit of the felling as opportunity offers or demand arises of a maximum number of other trees such as Saj, Blackwood, etc., within the "coupe" of the year.

(*b*) To regulate the cutting of bamboos, by closing compartment in alternate, or for two, years. Colonel Doveton suggests the clear cutting of bamboos in broad belts with the object of favouring tree-growth in areas, which are too exclusively occupied by bamboos consequent on the old Dhya cultivations. This should be considered.

(*c*) To prescribe works of improvement such as the weeding out of the unsound teak of the III and IV classes which are often twice as numerous as the sound trees of these classes, and interfering with these latter. The clearing of the crowns of any promising teak by the girdling or felling of other trees may, if found practicable, also be usefully carried out.

(*d*) To project a complete set of roads to supplement those now existing and to feed the same. They need only be laid out and can be made as the parts tapped come under working. The feasibility of a tram line of 7 miles in length from the forest boundary on the west to the Ghât on the Pranhita river at Dewalmani and also of a line of about the same length from Allapilli south along the western boundary should be discussed.

The 1 class sound timber will go out in the log and will command a ready sale at Sironcha or Raja Mandri.

The unsound timber must be converted at Allapilli, and for this purpose it may be necessary to replace some of the old engines and machinery. There are—2=16 H.-P. and 3=12 H.-P. engines, 2 vertical saw frames and 1 circular bench.

It is understood that 800 to 1,000 tons of converted material, such as can be obtained from the unsound trees, will be easily disposed of annually on the Godáveri river. A small quantity may find an outlet at Warora to which place it can be carted at a cost of eight annas a cubic foot.

The financial prospects will have to be worked out, but roughly it may be estimated that the gross receipts will be :—

	R
200 tons from sound trees	12,000
800 tons of scantlings from unsound trees	45,000
	57,000
and that the annual expenditure will be R25,000 to R30,000, leaving a net return of, say, ...	30,000

Bamboos, as a market for them is developed, will also bring in revenue. Poles should in no case be cut except as provided under improvement fellings.

The Bori Forest.

A similar plan should be made for the Bori forest; only in this case no valuation-surveys* are at present necessary and the plan can be based entirely on area. The chief marketable products are still, as noted by Sir D. Brandis in 1876, teak tinnas (*Ougeinia dalbergioides*) and bamboos. There is, however, no appreciable number of sound I or II class teak trees, the extraction of which would, as in Ahiri, be spread over a definite number of years. The number of poles of 60 and 80 feet in height has considerably increased in the past 20 years, and the natural reproduction of teak has established an ample proportion of that species in the crop. The forest is, so far as its main crop is concerned, about middle aged, and all that is required are improvement fellings in the interests of this immature crop, by which will be cut the unsound and ill-grown specimens of teak, other spreading trees interfering with teak, all creepers and a certain number of tinnas poles. For the teak trees and tinnas poles a demand exists, and other trees which it is desirable to weed out may be felled or girdled and left. The operation must be carefully carried out, not with a view to the reproduction by seedling or coppice, though young shoots may spring up where trees are removed, but with a view to favouring the development of the best trees now constituting the forest. In other words, the felling will be a combined weeding and thinning.

The forest should be divided into compartments† in the way recommended for the Ahiri forest, and then gone over systematically in a fixed number of years. I am disposed to think that, like similar operations in the sâl forests of Northern India, the fellings must be done by departmental agency. Purchasers and consumers can then be admitted to fashion and remove the produce, but when the felling is left to these people they do not cut the trees which unsuited for their purpose are those the sylviculturist most desires to see removed. It may be possible to admit purchasers to commence the felling and then complete it by Government agency.

Every effort should be made to bring to market the fine bamboos found in Bori.

From 1890-91 the cutting out of old teak and some tinnas over 1′ 6″ in girth has been undertaken with the following results:—

Year.	Compartment.	Teak.		Tinnas poles.	Remarks.
		Trees.	Cubic feet.		
1890-91 . .	7	686	9,452	156	
1891-92 . .	6	497	10,973	1,831	‡ Trees marked only, cubic contents not known.
1892-93 . .	8	468	17,360	2,009	
1893-94 . .	10 or 11	1,258‡	...	1,093	
Total .	...	2,909	...	5,089	

* The record of valuation-surveys made by Mr. Dickins in 1890 appears to have been lost.

† This has been attempted, but the limits are uncertain both on the maps and on the ground.

The purchasers paid 10 annas a foot for converted teak and 7 or 8 annas a pole for tinnas for export to the Railway line.

An essential part of the working scheme will be the improvement and extension of the roads within the forest and also the improvement of the road linking the forest with the Railway line. This, as well as the possibility of utilising waterways, was discussed on page 39 of Dr. Schlich's report of 1883, but so far the opening up of the lines of export has not progressed.

The Dudhára Forest.

This reserve of 10,000 acres is situated in the Gaikhuri Range of the Bhandára District and comprises an extremely promising young high forest with a fair proportion of teak, Bijasal, ironwood (Burmese pyinkado) and other valuable woods. It is for the most part very complete with a good height and vigorous growth. A remarkable feature is that, although the IV class teak must have resulted greatly from coppice, it stands on the ground and not on unsound stools and pollarded stumps as elsewhere.

The ridges and open parts produce much grass which is cut and extracted.

At present, more particularly as the forest is continuous with private forests, which meet all demands, there is nothing to be done but to continue the closure and effective protection, which have been so beneficial to its development.

The Moharli Forest.

This forest consists of 418 square miles. A considerable proportion of the area, however, comprises forests, in which bamboo predominates and anything approaching clear felling would result in a pure forest of bamboos.

The demand will be seen from the following statement of receipts for the past 11 years on account of different products in the Moharli Range:—

Receipts.

Year.	Timber.	Fuel and Charcoal.	Bamboos.	Grass.	Grazing.	Miscellaneous minor produce.	Total.
	R	R	R	R	R	R	R
1882-83	7,984	282	13,229	1,700	1,827	437	25,459
1883-84	21,974	408	12,816	2,034	1,916	1,102	40,250
1884-85	4,396	604	10,813	2,378	2,050	892	21,133
1885-86	12,484	434	8,325	2,215	2,207	938	26,603
1886-87	12,774	432	8,428	1,782	2,438	1,051	26,905
1887-88	17,062	389	8,566	2,023	3,751	676	32,467
1888-89	27,237	954	11,073	2,203	6,265	1,353	49,085
1889-90	9,857	1,389	8,992	2,739	4,652	2,115	29,744
1890-91	8,572	1,090	9,865	3,087	5,909	1,001	29,524
1891-92	16,952	1,410	11,429	3,047	5,381	1,250	39,469
1892-93	16,533	906	5,286	1,957	5,511	1,012	31,205
Total	1,55,825	8,298	1,08,822	25,165	41,907	11,827	3,51,844
Average	14,166	754	9,893	2,288	3,810	1,075	31,986

Under timber it may be noted that the entire revenue, except R3,000 or 4,000 a year, is derived from the sale of 5,000 mine props a year at Warora. These props are of Saj or Tendu only, are ten feet long with a minimum diameter of eight inches at the thin end and realize three rupees each. On an average, the following has been the annual outturn in number and cubic feet, of the main descriptions of timber removed by purchasers:—

	No.	Cubic feet.
Askurs (cart axles)	28,291	1,770
Thunis „	10,987	10,987
Mayals (beams)	405	1,620
Mundahs (uprights)	2,376	7,128
Dandees (poles)	5,842	6,580
Khakars (rafters)	40,335	16,130
Dhuras (cart poles)	608	750
Nagars „	1,529	765

The best way of systematising work in this forest seems to be, to set aside certain areas on fairly good soil with but little bamboo and as completely stocked as can be selected to meet the local demand in wood. A suitable area on the west is that situate north of the road from Susa to Moharli, and similar areas might be selected on the south and east near the Mul roads. These would be treated as coppice with standards as proposed elsewhere, except that belts of bamboos along the banks of streams, when included in these areas, should not be cut over. Excluding the above-noted areas as well as the considerable tract, which from the rocky nature of soil and the prevalence of bamboos cannot be worked except for this product, the remainder should be roughly divided into a number of blocks, to be thinned over in rotation for the Saj and Tendu suitable for mine props, the Dhaura for cart axles and to meet any other special requirements.

The bamboo areas should be opened and closed in rotation.

Roads should be projected. That from Moharli through Goberdhan, Pipalkot and on to the Mul road should be completed and made passable at all seasons. The road which is being made from south of Moharli to the Chánda-Warora road at Bhanduk should also be made into a good, all-through-the-year serviceable road.

Government of India Central Printing Office.—No. 217 R. & A.—8-8-94.—250.—J. N. D.